



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/792,244	03/03/2004	David R. Hembree	3592.10US (97-0321.10/US)	3976
24247	7590	07/11/2007	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			MITCHELL, JAMES M	
			ART UNIT	PAPER NUMBER
			2813	
			MAIL DATE	DELIVERY MODE
			07/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/792,244

Applicant(s)

HEMBREE, DAVID R.

Examiner

James M. Mitchell

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4/16/2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to applicant's amendment filed April 16, 2007.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mertol (U.S. 6,008,536) in combination with Chen et al. (U.S. 6, 403, 882) and Katchmar (U.S. 5,661,902).

Mertol (Fig.1, 2) discloses a semiconductor assembly comprising: a substrate (14) having a plurality of circuits (i.e. 24 in contact with balls) on a portion of a surface thereof; a semiconductor die (12) having a plurality of bond pads located on an active surface thereof (i.e. portion in contact with balls) and having a back side surface; a plurality of solder balls (20) connecting at least a portion of the plurality of bond pads of the semiconductor die to at least a portion of the plurality of circuits of the substrate; one of a glob top material and low viscosity polymeric (e.g. "epoxy", 34) filling any space between the substrate and the semiconductor die; an thermal conductive adhesive (36) contacting at least a portion of the back side surface of the semiconductor die; and a heat sink cap (16) having portion thereof contacting a portion of the substrate covering the interface, the semiconductor die, the plurality of solder balls, and a portion of the

Art Unit: 2813

substrate free of gaps therewith¹ (e.g. cap attached by adhesive, 40), the heat sink cap having the edge portion (e.g., bottom of cap) substantially contacting the substrate (Fig. 1) and the heat sink contacting at least a portion the interface.

Mertol does not appear to explicitly show that its thermal adhesive is a compliant under light pressure, adhesive, gel elastomer, cross linked silicone, filled with thermally conductive material having wetting properties.

However, Chen utilizes a thermal interface that is an adhesive silicone that is compliant under light pressure², filled with thermally conductive material having wetting properties (silicone filled with silver; Col. 3, Lines 15-24).

It would have been obvious to one of ordinary skill at the time the invention was made to form the adhesive of Mertol³ with the thermal interface of Chen in order to provide thermal conductivity as taught by Chen (Col. 3, Lines 22-24).

Neither Mertol nor Chen appears to explicitly disclose that its silicone is a gel/elastomer formed by cross-linking its silicone.

However, Katchmar (Col. 5, Lines 22-25) teaches a gel/elastomer silicone and therefore cross-linked silicone.

It would have been obvious to one of ordinary skill in the art to cross-link the modified silicone interface of Mertol in order to provide an interface with a low modulus as taught by Chen (Col. 5, Lines 22-25) and as required by Chen (Col. 2, Lines 49-51)⁴.

¹ For examination purposes, understood to mean free of any empty gaps between the cap and substrate.

² Light pressure is subjective.

³ Mertol only provides some examples of what the interface material may be.

Claims 2, 5, 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mertol (U.S. 6,008,536), Chen et al. (U.S. 6,403,882) and Katchmar (U.S. 5,661,902) as applied to claims 1, 4, 6 and 9 and further in combination with Chia et al. (U.S. 6,225,695).

Neither Mertol, Chen nor Katchmar appear to show the heat-dissipating member with fins.

Chia teaches the use of fins (Fig 1A).

It would have been obvious to one of ordinary skill in the art to incorporate fins on the modified heat-dissipating member of Mertol in order to provide greater surface area for cooling as taught by Chia (Col. 2, Lines 53-55).

Response to Arguments

Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

⁴ Because the disclosure makes obvious the same material as claimed, it functions and has same

Art Unit: 2813

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2813

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ex. Mitchell, J.D.
July 9, 2007



CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800